## REMARKS

The applicant has carefully considered the Office action dated January 18, 2006 and the references it cites. By way of this Response, claims 1 and 12 have been amended, claims 4, 15, 16, and 18-25 have been cancelled without prejudice to their further prosecution, and new claims 26 and 27 have been added. In view of the following, it is respectfully submitted that all pending claims are in condition for allowance and favorable reconsideration is respectfully requested.

Turning to the art rejections, the Office action rejected all pending claims as being unpatentable over one or more of newly cited Jiang et al., U.S. Patent 6,610,591 and Chang et al., U.S. Patent 5,431,328 and previously cited Miller et al., U.S. Patent 6,759,687, and Reedy et al., U.S. Patent 6,583,445. The applicant respectfully traverses these rejections.

Independent claim 1 recites a method comprising, among other things, coupling at least one spacer having a melting point above solder to the chip die or the substrate, the spacer being a unitary conductive structure not having a conductive covering. None of the cited art teaches or suggests such a method.

For example, Jiang et al. uses balls or bumps 40 having a core material 42 covered with an outer layer 44. In the words of Jiang et al:

> "...**outer layer 44 may be any known conductive material, such as silver, nickel, palladium, gold, titanium, copper or alloy thereof**, as long as the rigidity and melting temperature of the material of the outer layer 44 is less than that of the core material 42 and as long as the conductive material causes solder to adhere thereto without the use of solder flux or an additional amount of solder."

(See, Jiang et al., at Col. 8, lines 2-6)(emphasis added). Jiang et al. indicates that the soft outer layer 44 of the balls 40 may receive marks from test sockets during burn-in testing, and this may result in different ball heights during later surface mounting of the die 20 on the substrate 10. (See, Jiang et al., at Col. 7, lines 20-24). Although Jiang et al. relies on the core material 42 to effect a substantially consistent base height 48, the problem of coplanarity is merely reduced by Jiang et al.'s approach, because the use of the coated balls 40 between the die 20 and substate 10 still can result in a variation in the height of an individual ball 40 caused by the presence of the outer layer 44. (See, Jiang et al., at Col. 7, lines 24-41). All of Jiang. et al.'s embodiments utilize balls or bumps 40 with a core material 42 and an outer, lower melting point material 44. (See, Jiang et al., at Col. 7, line 64 through Col. 8, line 10; Col. 8, lines 53-56 and line 65 through Col. 9, line 1; Col. 9, lines 23-33 and lines 56-66). Contrary to Jiang et al., claim 1 recites a spacer which is a unitary conductive structure which does not have a conductive covering, thereby avoiding the coplanarity problem of Jiang et al. Jiang et al. does not contemplate, teach or suggest employing a unitary spacer without a covering as recited in claim 1. Accordingly, it is clear that the rejections based solely on Jiang et al. must be withdrawn.

The other references do not overcome the deficiencies of Jiang et al. For example, Chang et al. describe the use of composite bumps having a polymer body 32 covered by at least a conductive metal coating 36. (See Chang et al., at Col. 3, lines 23-28 and lines 51-56, and Col. 4 at lines 12-16 and lines 35-39). The combination of Jiang et al. and Chang et al. would thus result in composite bumps with a core and a covering, not a spacer having a

unitary conductive structure and no conductive covering as recited in claim 1. Accordingly, the combination of Jiang et al. and Chang et al. does not teach or suggest the recitations of claim 1

Miller et al., as pointed out in applicant's response dated October 21, 2005, expressly follow the prior art solder ball approach described in paragraphs **[0002]** and **[0003]** of the applicant's specification. In particular, Miller et al. use "solder bump reflow technology" to couple an optoelectronic device to an optical device system. (See, Miller at Col. 4, lines 44-48). Miller et al. do ***not*** employ a spacer having a melting point above solder or a spacer having a unitary conductive structure and no conductive covering to control the distance between the optoelectronic device and the optical device system. Accordingly, the combination of Jiang et al. and Miller et al does not teach or suggest the recitations of claim 1.

Reedy also fails to overcome the above-noted deficiencies of Jiang et al. Reedy employs a large solder ball 18, not a spacer having a unitary conductive structure without a conductive covering. Accordingly, since none of Jiang et al., Chang et al., Miller et al., nor Reedy et al. teach or suggest a spacer having a unitary structure without a conductive covering, irrespective of how one combines Jiang et al., Chang et al., Miller et al. and Reedy et al., one does not arrive at the method recited in claim 1. Accordingly, it is respectfully submitted that claim 1 and all claims depending therefrom are in condition for allowance.

Independent claim 12 is also allowable. Claim 12 recites a method comprising, among other things, coupling at least one spacer to a first one of the substrate or the flip chip die, the spacer having a melting point greater than

a melting point of a conductive pad, the spacer being a unitary conductive structure not having a conductive covering. As discussed in detail above, none of Jiang et al., Chang et al., Miller et al., and/or Reedy et al., whether taken alone or in combination, either teach or suggest such a method. Accordingly, claim 12 and all claims depending therefrom are in condition for allowance.

In view of the foregoing, it is respectfully submitted that all pending claims are in condition for allowance.

The amendments made herein neither raise new issues nor require a further search, and are submitted to more clearly define applicant's claims in view of the newly cited references. The amendments could not have been made earlier because applicant could not foresee that references teaching balls or bumps precoated with a layer of another material would be applied to applicant' independent claims 1 and 12.

If the Examiner is of the opinion that a telephone conference would expedite the prosecution of this case, the Examiner is invited to contact the undersigned at the number identified below.

Respectfully submitted,

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